

# FLORIAN FRICK

## CONTACT INFORMATION

Department of Mathematical Sciences  
Carnegie Mellon University  
Pittsburgh, PA 15213  
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www.math.cmu.edu/~ffrick/

## RESEARCH INTERESTS

Geometric and Topological Combinatorics, Discrete and Metric Geometry, Geometric Topology and Applied Algebraic Topology

## EDUCATION

04/2012–07/2015      Ph.D., Technische Universität Berlin  
    Funded via the Berlin Mathematical School, advisor: John M. Sullivan

10/2010–11/2014      M.Sc., Technische Universität Berlin

10/2007–08/2010      B.Sc., Technische Universität Berlin

## EMPLOYMENT

07/2021–              Associate Professor, Carnegie Mellon University

09/2021–07/2022      Gastprofessor (W3), Acting Head of the Discrete Geometry and Topological Combinatorics research group, Freie Universität Berlin (on leave from CMU)

07/2018–06/2021      Assistant Professor, Carnegie Mellon University

01/2018–06/2018      H. C. Wang Assistant Professor, Cornell University

08/2017–12/2017      Postdoctoral Fellow, MSRI  
    In the program *Geometric and Topological Combinatorics* and Visiting Scholar, University of California, Berkeley

08/2015–07/2017      H. C. Wang Assistant Professor, Cornell University

## AWARDS AND GRANTS

2021–2026              NSF CAREER Grant DMS 2042428

2019–2023              Sloan Research Fellowship

2019–2022              NSF Grant DMS 1855591

07/2016                Richard-Rado-Preis  
    Dissertation award of the German Mathematics Society DMV for a thesis in discrete mathematics defended in 2014 or 2015; Juror: Ben J. Green

## PUBLICATIONS

★ undergraduate coauthor      ● graduate student coauthor

1. Topological methods in zero-sum Ramsey theory  
with Jacob Lehmann Duke★, Meenakshi McNamara★, Hannah Park-Kaufmann★, Steven Raanes★, Steven Simon, Darrion Thornburgh★, and Zoe Wellner●  
arxiv:2310.17065
2. Hausdorff vs Gromov–Hausdorff distances  
with Henry Adams, Sushovan Majhi, and Nicholas McBride●  
arxiv:2309.16648
3. Colorful Borsuk–Ulam theorems and applications  
with Zoe Wellner●  
arxiv:2309.14539
4. Gromov–Hausdorff distances, Borsuk–Ulam theorems, and Vietoris–Rips complexes  
with Henry Adams, Johnathan Bush, Nate Clause●, Mario Gómez●, Michael Harrison, R. Amzi Jeffs, Evgeniya Lagoda●, Sunhyuk Lim, Facundo Mémoli, Michael Moy●, Nikola Sadovek●, Matt Superdock, Daniel Vargas●, Qingsong Wang, Ling Zhou●  
arxiv:2301.00246
5. Transversal generalizations of hyperplane equipartitions  
with Samuel Murray★, Steven Simon, and Laura Stemmler★  
*Int. Math. Res. Not. IMRN* (2023), to appear  
arxiv:2210.15423
6. Unit sphere fibrations in Euclidean space  
with Daniel Asimov, Michael Harrison, and Wesley Pegden  
*Proc. Edinb. Math. Soc.* (2023), to appear  
arxiv:2210.13981
7. Random complexes with free involution  
with Andrew Newman  
*Israel J. Math.* (2023), to appear  
arxiv:2210.11316
8. Vietoris thickenings and complexes have isomorphic homotopy groups  
with Henry Adams and Žiga Virk  
*J. Appl. Comput. Topol.* **7**, 221–241 (2023)  
arxiv:2206.08812
9. Colorful words and d-Tverberg complexes  
with Amzi Jeffs  
*Comb. Theory* (2023), to appear  
arxiv:2205.04776
10. Vertex numbers of simplicial complexes with free abelian fundamental group  
with Matt Superdock●  
*Ars. Math. Contemp.* (2023), to appear  
arxiv:2109.11952
11. On inscribed trapezoids and affinely 3-regular maps  
with Michael Harrison  
*Proc. Roy. Soc. Edinburgh Sect. A* (2023), to appear  
arxiv:2109.05985

12. Embedding dimensions of simplicial complexes on few vertices  
with Mirabel Hu\*, Verity Scheel\*, and Steven Simon  
*Ann. Comb.* **27**, 993–1003 (2023)  
arxiv:2109.04855
13. Coupled embeddability  
with Michael Harrison  
*Bull. Lond. Math. Soc.* **54** (5), 1609–1629 (2022)  
arxiv:2107.09816
14. The topology of projective codes and the distribution of zeros of odd maps  
with Henry Adams and Johnathan Bush  
*Michigan Math. J.* (2023), to appear  
arxiv:2106.14677
15. Spaces of embeddings: Nonsingular bilinear maps, chirality, and their generalizations  
with Michael Harrison  
*Proc. Amer. Math. Soc.* **150**, 423–437 (2022)  
arxiv:2010.11996
16. What can you draw?  
with Fei Peng\*  
*Amer. Math. Monthly* **130** (1), 5–19 (2023)  
arxiv:2004.01049
17. The geometry of fair division  
*Snapshots of modern mathematics from Oberwolfach 2023* (7)  
<https://doi.org/10.14760/SNAP-2023-007-EN>
18. Metric thickenings, Borsuk–Ulam theorems, and orbitopes  
with Henry Adams and Johnathan Bush•  
*Mathematika* **66**, 79–102 (2020)  
arxiv:1907.06276
19. A nonlinear Lazarev–Lieb theorem:  $L^2$ -orthogonality via motion planning  
with Matt Superdock•  
*J. Topol. Anal.* **14** (3), 569–585 (2022)  
arxiv:1906.04417
20. Borsuk–Ulam theorems for products of spheres and Stiefel manifolds revisited  
with Yu Hin Chan\*, Shujian Chen\*, and J. Tristan Hull\*  
*Topol. Methods Nonlinear Anal.* **55** (2), 553–564 (2020)  
arxiv:1902.00935
21. Fair splittings by independent sets in sparse graphs  
with Alexander Black\*, Umur Cetin\*, Alexander Pacun\*, and Linus Setiabrata\*  
*Israel J. Math.* **236**, 603–627 (2020)  
arxiv:1809.03268
22. Barycenters of points in polytope skeleta  
with Michael Gene Dobbins  
*Contemp. Math.* **764**, 83–88 (2021)  
arxiv:1809.01613
23. Splitting loops and necklaces: Variants of the square peg problem  
with Jai Aslam\*, Shujian Chen\*, Sam Saloff-Coste\*, Linus Setiabrata\*, and Hugh Thomas  
*Forum Math. Sigma* **8**, e5 (2020)  
arxiv:1806.02484

24. Neural codes, decidability, and a new local obstruction to convexity  
with Aaron Chen<sup>•</sup> and Anne Shiu  
*SIAM J. Appl. Algebra Geom.* **3** (1), 44–66 (2019)  
arxiv:1803.11516
25. On the generalized Erdős–Kneser conjecture: Proofs and reductions  
with Jai Aslam<sup>\*</sup>, Shuli Chen<sup>\*</sup>, Ethan Coldren<sup>\*</sup>, and Linus Setiabrata<sup>\*</sup>  
*J. Combin. Theory, Ser. B* **135**, 227–237 (2019)  
arxiv:1712.03456
26. Chromatic numbers of stable Kneser hypergraphs via topological Tverberg-type theorems  
*Int. Math. Res. Not. IMRN* **2020** (13), 4037–4061 (2020)  
arxiv:1710.09434
27. Colorful coverings of polytopes and piercing numbers of colorful  $d$ -intervals  
with Shira Zerbib  
*Combinatorica* **39** (3), 627–637 (2019)  
arxiv:1710.07722
28. Metric reconstruction via optimal transport  
with Michał Adamaszek and Henry Adams  
*SIAM J. Appl. Algebra Geom.* **2** (4), 597–619 (2018)  
arxiv:1706.04876
29. Achieving rental harmony with a secretive roommate  
with Kelsey Houston-Edwards<sup>•</sup> and Frédéric Meunier  
*Amer. Math. Monthly* **126** (1), 18–32 (2019)  
arxiv:1702.07325
30. On affine Tverberg-type results without continuous generalization  
to be rewritten  
arxiv:1702.05466
31. Fair division and generalizations of Sperner- and KKM-type results  
with M. Asada<sup>\*</sup>, V. Pisharody<sup>\*</sup>, M. Polevy<sup>\*</sup>, D. Stoner<sup>\*</sup>, L.H. Tsang<sup>\*</sup>, and Z. Wellner<sup>\*</sup>  
*SIAM J. Discrete Math.* **32** (1), 591–610 (2018)  
arxiv:1701.04955
32. On Reay’s relaxed Tverberg conjecture and generalizations of Conway’s thrackle conjecture  
with M. Asada<sup>\*</sup>, R. Chen<sup>\*</sup>, F. Huang<sup>\*</sup>, M. Polevy<sup>\*</sup>, D. Stoner<sup>\*</sup>, L.H. Tsang<sup>\*</sup>, and Z. Wellner<sup>\*</sup>  
*Electronic J. Combin.* **25** (3), P3.16 (2018)  
arxiv:1608.04279
33. Minkowski complexes and convex threshold dimension  
with Raman Sanyal  
*J. Combin. Theory, Ser. A* **151**, 202–206 (2017)  
arxiv:1607.07814
34. Intersection patterns of finite sets and of convex sets  
*Proc. Amer. Math. Soc.* **145** (7), 2827–2842 (2017)  
arxiv:1607.01003
35. On homotopy types of Euclidean Rips complexes  
with Michał Adamaszek and Adrien Vakili<sup>\*</sup>  
*Discrete Comput. Geom.* **58** (3), 526–542 (2017)  
arxiv:1602.04131

36. Barycenters of Polytope Skeleta and Counterexamples to the Topological Tverberg Conjecture, via Constraints  
with Pavle Blagojević and Günter M. Ziegler  
*J. Europ. Math. Soc. (JEMS)* **21** (7), 2107–2116 (2019)  
arxiv:1510.07984
37. Hyperplane mass partitions via relative equivariant obstruction theory  
with Pavle Blagojević, Albert Haase\*, and Günter M. Ziegler  
*Documenta Math.* **21**, 735–771 (2016)  
arxiv:1509.02959
38. Topology of the Grünbaum–Hadwiger–Ramos hyperplane mass partition problem  
with Pavle Blagojević, Albert Haase\*, and Günter M. Ziegler  
*Trans. Amer. Math. Soc.* **370** (10), 6795–6824 (2018)  
arxiv:1502.02975
39. Counterexamples to the topological Tverberg conjecture  
*Oberwolfach Reports* **12** (1), 318–321 (2015)  
arxiv:1502.00947
40. Nerve complexes of circular arcs  
with Michał Adamaszek, Henry Adams, Chris Peterson, and Corrine Previtte-Johnson  
*Discrete Comput. Geom.* **56** (2), 251–273 (2016)  
arxiv:1410.4336
41. Tverberg plus constraints  
with Pavle Blagojević and Günter M. Ziegler  
*Bull. Lond. Math. Soc.* **46** (5), 953–967 (2014)  
arxiv:1401.0690
42. A minimal irreducible triangulation of  $S^3$   
*Combinatorial Methods in Topology and Algebra*, Springer INdAM Series **12**, 49–52 (2015)

#### SELECTED INVITED TALKS

- 01/2024                    AMS Special Session *Discrete Homotopy Theory*  
                                  Joint Mathematics Meetings, San Francisco
- 01/2024                    AMS Special Session *Topological and Algebraic Approaches for Optimization*  
                                  Joint Mathematics Meetings, San Francisco
- 12/2023                    *Geometric, Algebraic, and Topological Combinatorics*, MF Oberwolfach
- 06/2023                    *New trends from Classical Theorems in Geometry, Combinatorics, and Topology*  
                                  Casa Matemática Oaxaca, Mexico
- 05/2023                    *GMZ 60: Geometry, Topology, Community*, Freie Universität Berlin, Germany
- 04/2023                    Discrete Math / Algebra Seminar, University of Delaware
- 10/2022                    Combinatorics and Discrete Geometry Seminar, Cornell University
- 10/2022                    Algebra Combinatorics Geometry Seminar, University of Pittsburgh
- 06/2022                    Seminar on Nonlinear Algebra, Max Planck Institute, Leipzig
- 05/2022                    *Colloquia in Combinatorics*, Queen Mary University, London

- 05/2022 *Bridging Applied and Quantitative Topology* (online)
- 11/2021 *Facets of Complexity*, Freie Universität Berlin
- 10/2021 AMS Special Session *Geometric and Topological Combinatorics and Their Applications*  
(online)  
AMS Fall Central Sectional (formerly at Creighton University)
- 06/2021 Applied Algebraic Topology Research Network (online)
- 04/2021 Colloquium, Bard College (online)
- 03/2021 AMS Special Session *Applied Combinatorics* (online)  
Spring Eastern Sectional Meeting (formerly at Brown University)
- 03/2021 Topology and Geometry Seminar, University of Haifa (online)
- 02/2021 Topology Seminar, Northeastern University (online)
- 01/2021 *Facets of Complexity*, Berlin (online)
- 10/2020 Combinatorics Seminar, University of Washington (online)
- 09/2020 *Discrete Geometry*, MF Oberwolfach (online)
- 08/2020 *Topological Combinatorics Workshop*, Charles University, Prague (online)
- 05/2020 Discrete Math Seminar, Iowa State University (online)
- 02/2020 Combinatorics Seminar, University of Michigan
- 11/2019 Atlanta Lecture Series on Combinatorics and Graph Theory  
Emory University
- 11/2019 AMS Special Session *Topological Complexity and Related Topics*  
AMS Fall Southeastern Sectional Meeting, University of Florida
- 11/2019 AMS Special Session *Geometric and Topological Combinatorics*  
AMS Fall Southeastern Sectional Meeting, University of Florida
- 10/2019 *Helly and Tverberg type Theorems*, CMO, Oaxaca, Mexico
- 09/2019 AMS Special Session *Algebraic and Geometric Combinatorics*  
AMS Fall Central Sectional Meeting, University of Wisconsin–Madison
- 08/2019 *Geometric, Algebraic, and Topological Combinatorics*, MF Oberwolfach
- 05/2019 Math Club, SUNY Stony Brook
- 04/2019 Geometry Seminar, CUNY and New York University
- 04/2019 Algebra/Topology Seminar, University at Albany SUNY
- 01/2019 *ERC Workshop: Adventures in Combinatorial Geometry*  
Ein Gedi, Israel
- 01/2019 AMS Special Session *Geometric and Topological Combinatorics*  
Joint Mathematics Meetings, Baltimore
- 11/2018 Theoretical Biology Seminar, Pennsylvania State University

- 10/2018 Math Club, Carnegie Mellon University
- 07/2018 Combinatorics and Geometry Seminar, University of Washington
- 04/2018 Combinatorics Seminar, Georgia Tech
- 04/2018 Discrete Math Seminar, UMass Amherst
- 04/2018 Colloquium, Lehigh University
- 04/2018 Topology and Robotics Seminar, Lehigh University
- 03/2018 *ERC Workshop: Geometric Transversals and Epsilon-Nets*  
Ein Gedi, Israel
- 02/2018 Topology and Geometry Seminar, Binghamton University
- 01/2018 Colloquium, University of California, Davis
- 01/2018 AMS Special Session *Topological Data Analysis*  
Joint Mathematics Meetings, San Diego
- 01/2018 Colloquium, University of Illinois at Chicago
- 12/2017 Colloquium, Northeastern University
- 12/2017 Colloquium, Carnegie Mellon University
- 12/2017 Colloquium, Washington University in St. Louis
- 10/2017 *Geometric and Topological Combinatorics: Modern Techniques and Methods*  
Mathematical Sciences Research Institute, Berkeley
- 08/2017 SIAM Minisymposium on *Geometry of Materials*  
SIAM Conference on Applied Algebraic Geometry, Atlanta
- 06/2017 Discrete Geometry Seminar, Freie Universität Berlin
- 05/2017 *Conference on Discrete Geometry and Algebraic Combinatorics*, South Padre Island
- 04/2017 Geometry Seminar, New York University
- 03/2017 Topology Seminar, University of Rochester
- 02/2017 Discrete Geometry and Combinatorics Seminar, Cornell University
- 01/2017 Combinatorics Seminar, University of Washington
- 01/2017 Algebra & Discrete Mathematics Seminar, University of California, Davis
- 12/2016 *Topology and Geometry in a Discrete Setting*, ICERM, Providence
- 11/2016 Applied Algebraic Topology Research Network, online seminar
- 10/2016 *Transversal, Helly and Tverberg type Theorems*, CMO, Oaxaca, Mexico
- 09/2016 Special Session *Combinatorics, at the Crossroads of Algebra, Geometry, and Topology*  
AMS Sectional Meeting at Bowdoin College
- 09/2016 Topology and Geometric Group Theory Seminar, Cornell University
- 07/2016 *Symposium on Discrete Mathematics*, Freie Universität Berlin
- 07/2016 Smorgasbord Seminar, Cornell University

06/2016	Pattern Analysis Lab, Colorado State University
05/2016	<i>Topology Festival</i> , Cornell University
03/2016	Combinatorics Seminar, The Ohio State University
01/2016	Algebra & Discrete Mathematics Seminar, University of California, Davis
01/2016	AMS Special Session <i>Algebraic and Topological Methods in Combinatorics</i> Joint Mathematics Meetings, Seattle
10/2015	Oliverclub (Department Colloquium), Cornell University
10/2015	Combinatorics Seminar, University of Miami
10/2015	Topology and Geometry Seminar, Binghamton University
09/2015	Topology and Geometric Group Theory Seminar, Cornell University
06/2015	Algebra and Topology Seminar, University of Copenhagen
06/2015	Applied Topology Seminar, EPF Lausanne
03/2015	Discrete Geometry and Combinatorics Seminar, Cornell University
03/2015	ERC Workshop <i>Discrete Models in Geometry and Topology</i> Freie Universität Berlin
02/2015	<i>Geometric and Algebraic Combinatorics</i> , MF Oberwolfach
11/2014	Topological Combinatorics Seminar, Freie Universität Berlin
07/2014	<i>Workshop Applied Algebraic Topology</i> , CIEM, Castro Urdiales, Spain
04/2014	<i>Topology with combinatorial and geometric flavor</i> Adam Mickiewicz University, Poznań

#### POSTDOCS MENTORED OR CO-MENTORED

2023–	Marta Pavelka
2022–	Alan Lew
2022–2023	Ali Mohammad Nezhad
2021–	Amzi Jeffs, NSF postdoc fellowship
2020	Nóra Frankl
2020–	Andrew Newman
2019–2021	Michael Harrison

#### PHD STUDENTS GRADUATED

2022	Jonathan Kliem (at FU Berlin)
2021	Matt Superdock

#### EXTERNAL PHD COMMITTEES

09/2023	Tatiana Levinson
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Freie Universität Berlin, advised by Pavle Blagojević

05/2022 Olakunle Abawonse  
Binghamton University, advised by Laura Anderson

06/2017 Albert Haase  
Freie Universität Berlin, advised by Günter M. Ziegler

#### UNDERGRADUATE RESEARCH ADVISING

2018–  
projects. Advised eight CMU undergraduates on honor's theses, research and reading projects.

Summer 2023 Advised four undergraduate students within my REU *Geometry and Topology in a Discrete Setting*.

2022 Advisor for Pablo Agustin Martin Torres Master's thesis at Freie Universität Berlin.

Summer 2021 Advised four undergraduate students.

Summer 2019 Advised two undergraduate students.

2016–2018 Led undergraduate summer research program on *Topological Methods in Discrete Geometry*. Advised 24 students.

#### TEACHING

Spring 2024 Algebraic Topology (graduate course)

Fall 2023 General Topology (graduate course)

Fall 2023 Discrete Mathematics (graduate course)

Fall 2022 General Topology (graduate course)

Fall 2022 Discrete Mathematics (graduate course)

Summer 2022 Geometry and Topology in a Discrete Setting (graduate course, co-taught with Pavle Blagojević as a block course)

Summer 2022 Student Seminar in Discrete Geometry (graduate course)

Summer 2022 Discrete Geometry II (graduate course)

Winter 2021/22 Discrete Geometry III (graduate course)

Winter 2021/22 Discrete Geometry I (undergraduate course, co-taught with Christian Haase)

Spring 2021 Graph Theory (undergraduate course)

Fall 2020 Discrete Mathematics (graduate course)

Fall 2020 Algebraic Topology (graduate course)

Spring 2020 Differential Geometry of Curves and Surfaces (undergraduate course)

Fall 2019 Discrete Mathematics (graduate course)

Spring 2019 Graph Theory (undergraduate course, co-taught with Wesley Pegden)

Fall 2018 Algebraic Topology (graduate course)

<i>Spring 2018</i>	Prove it! (undergraduate, introduction to proof-based mathematics)
<i>Spring 2018</i>	Introduction to Combinatorics (upper-level undergraduate)
<i>Spring 2017</i>	Seminar in Geometry: Discrete and Metric Geometry
<i>Fall 2016</i>	Topics in Topology: Equivariant Cohomology
<i>Fall 2016</i>	Introduction to Combinatorics (upper-level undergraduate)
<i>Fall 2016</i>	Putnam Practice Sessions (Co-organizer)
<i>Spring 2016</i>	Calculus II
<i>Fall 2015</i>	Putnam Practice Sessions (Co-organizer)
<i>Fall 2015</i>	Calculus I

#### EDITORIAL ACTIVITIES

2024– Handling Editor, *Combinatorial Theory*

#### REFEREEING

Referee for journals, conferences, contributions to book projects, and book manuscripts; program committee member FPSAC 2019

#### ORGANIZING

- Co-organizer of the MSRI Summer School *Topological Toolbox for Discrete Mathematicians*
- Co-organizer of the BMS Summer School *Geometry and Topology in a Discrete Setting*
- Co-organizer of the special session *Algebraic, Geometric, and Topological Methods in Combinatorics* at the AMS Spring Eastern Sectional Meeting at Northeastern in April 2018
- Organizer of the *Geometric and Topological Combinatorics Postdoc Seminar* at MSRI during Fall 2017
- Co-organizer of *Topology Festival* at Cornell University
- Co-organizer of *Topology and Geometric Group Theory Seminar* at Cornell University
- Co-organizer of the special session *Geometry and Combinatorics of Cell Complexes* at the Mathematical Congress of the Americas 2017
- Co-organizer of minisymposium *Symmetric simplicial complexes and polytopes* at SIAM Conference on Applied Algebraic Geometry 2017

March 11, 2024